Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.99-105 (1975)

Nonsegmental Tone in Lango*

John M. Clifton
Indiana University

1. Introduction

It has been claimed that there exist morphemes consisting only of a nonsegmental, or floating tone,[1] that is, a tone which can be involved in various tone processes but which never has any surface manifestation itself. In this paper certain tone processes in Lango, a 'Nilotic' language of northern Uganda, which were first discussed in Maddieson, Shopen and Okello (1973) will be reexamined. In this reexamination of these processes special attention will be paid to certain examples which were apparently overlooked by Maddieson, Shopen and Okello (hereafter MSO), and which seem to indicate that not only do certain morphemes exist which consist only of a nonsegmental tone, but there are also rules which create nonsegmental tones, as well as rules which apparently refer only to nonsegmental tones. In conclusion, several other areas where the concept of nonsegmental tone might be useful will be discussed.

2. A Problematic case for MSO

In this section, two tone rules proposed by MSO for Lango will be examined, and it will be shown that these rules do not account for a particular set of forms. The first rule, Tone Shift (TS) can be given as follows:[2] (́ = high tone, ̀ = low tone, ̂ = falling tone)

Tone Shift

$$\acute{V}\ (C)\ \#\ (\grave{V})\ (C)\ \grave{V} \Longrightarrow \acute{V}\ (C)\ \#\ (\acute{V})\ (C)\ \hat{V}$$

This rule is proposed to account for the following forms:

(1)	a.	dùl ɔ̀pɑ̂t	(group of strangers)
	b.	cál ɔ́pɑ̂t	(picture of strangers)
(2)	a.	dùl rɛ̀ɔɛ̂	(group of fish)
	b.	cál rɛ̂ɔɛ̂	(picture of fish)
(3)	a.	dùl kɔ̀nɔ̀	(group of feathers)
	b.	cál kɔ́nɔ̀	(picture of feathers)

The longest expansion of the rule, in which the initial segment is a vowel, accounts for the alternation seen in the tone pattern of opɑt in (1), while the shorter expansion accounts for the alternation seen in the tone pattern of rɛɔɛ in (2) and of kono in

(3). In addition, a rule simplifying falls to highs when not in a monosyllabic word or before another fall can be seen to operate in (3b).

The other rule which will be examined here is Tone Copy (TC), which can be formulated as follows:

Tone Copy

[αRaised] → [-αRaised] / C [-αRaised] (C) __ # [+segmental]

This rule is proposed to account for the following forms:

(4) a. rɪ̀ŋ́ (meat)
b. rɪ̀ŋ̀ rómmí (meat of sheep)
c. rɪ̀ŋ̀ kónò (meat for feathers)

TC causes the final high of rɪ̀ŋ́ in (4a) to become a low in (4b) and (4c) since it is followed by another word. Furthermore, as can be seen in (4c), TS must apply before TC (that is, in a counter-bleeding order) so as to cause the initial low in kònò to become a high.

Up to this point, the analysis proposed by MSO seems to account for tonal alternations. However, MSO fails to notice certain forms for which their analysis generates incorrect forms. Such an example is (5).

(5) rɪ̀ŋ̀pât / *rɪ̀ŋ́pât (meat of strangers)

There is one other rule which we must refer to in this example, Vowel Coalescence (VC), which takes a V+V sequence where the first vowel is i, u, or o (or ɪ, ʊ, or ɔ) and reduces it to a single consonant with the tenseness of the first vowel and the place of articulation of the second. TS must have applied in (5) to account for the falling tone on the a; the question, then, is why the ɔ has a low tone instead of a high tone. One possible answer would be that VC has something to do with it, however, (6) shows that this is not the case:

(6) a. ɔ̀t ɑ̀wɔ́bí (house for a boy)
b. cál ɑ́wɔ́bí (picture of a boy)
c. rɪ̀ŋ́áwɔ́bí (meat of a boy)

Once again, TS accounts for the tone alternations in (6a) and (6b). In (6c), then, we must assume that TS applies before VC causing the a to surface with a high tone. Thus, only (5) remains anomalous in that the initial low in the second word is "skipped" by TS.

3. Tone processes and nonsegmental tone in Lango

In §2 a form was discussed which is problematic for the analysis proposed by MSO in that TS seemed to "skip" the initial low tone vowel in certain instances. In this section it will be

shown that such "skipping" of an initial low tone vowel when it is followed by a low tone vowel can also be found when the high tone meeting the structural description of TS is a nonsegmental high tone morpheme.

Nonsegmental tone morphemes must be proposed in at least two places in Lango. The first is for a certain class of possessive constructions. Most possessive constructions are regular in that they obey the rules discussed thus far. This is shown in (7) and (8):

(7) a. ŋèc gɔ́ɔ́r (the squirrels' backs)
b. dɔ́g gɔ́ɔ́r (the squirrels' mouths)
(8) a. ŋèc dòk (the cows' backs)
b. dɔ́g dôk (the cows' mouths)

The only alternation in tone pattern is in dok in (8), and this can be easily accounted for by TS. However, there is a small class of nouns which do pattern as expected when used as the first member in a construction showing inalienable possession. This can be seen in (9) and (10).

(9) a. tyɛ̀n gɔ́ɔ́r (the squirrels' legs)
b. yíb gɔ́ɔ́r (the squirrels' tails)
(10) a. tyɛ̀n dôk (the cows' legs)
b. yíb dòk (the cows' tails)

In (9b), gɔɔr is downstepped even though it is not preceded by a low tone on the surface; in (10a), dok has a falling tone even though there is no high to trigger TS; in (10b), dok has a low tone even though it is preceded by a high tone and therefore should trigger TS. These unexpected results cannot be due to gɔɔr and dok, as is shown by (7) and (8); therefore it must be due to tyɛn and yib. The most obvious solution to this problem is to claim that nouns in the class which contains tyɛn and yib require a morpheme in possessive constructions which consists of a polar nonsegmental tone. Thus, the underlying structures for (9) and (10) are given in (11) and (12), respectively.

(11) a. /tyɛ̀n ´ gɔ́ɔ́r/
b. /yíb ` gɔ́ɔ́r/
(12) a. /tyɛ̀n ´ dòk/
b. /yíb ` dòk/

Given these underlying representations, the correct surface representations will be predicted by the rules discussed above.

When this class of nouns which requires polar nonsegmental tone morphemes in the possessive constructions is used with words like opɑt, the following results are obtained:

(13) a. yíb ɔ̀pɑ̂t (the strangers' tails)
b. tyɛ̀n ɔ̀pɑ̂t / *tyɛ̀n ɔ́pɑ̂t (the strangers' legs)

The form in (13a) is what we expect in that the nonsegmental low tone demanded by yib "protects" opɑt from the effects of TS. However, (13b) is unexpected in that although the ɑ in opɑt is a fall, apparently by TS, the o remains low, it is "skipped" by TS.

The other place a nonsegmental tone morpheme is needed is in relative clause constructions. The differences between a simple sentence and a relative clause can be seen from the examples in (14).

(14)	Simple Sentence	Relative Clause
a.	ɲɔ́llɔ́wɔ́rɔ̀ (Pythons went)	ɲɔ́llɔ́wɔ́rɔ̀ (pythons which went)
b.	kíɛ ɔ́wɔ́rɔ̀ (Bees went)	kíc ɔ́wɔ́rɔ̀ (bees which went)
c.	rùdɔ̀wɔ̀rɔ̀ (Twins went)	rùdɔ̀wɔ́rɔ̀ (twins which went)
d.	dɔ̀x ɔ̀wɔ̀rɔ̀ (Cows went)	dɔ̀k ɔ̀wɔ́rɔ̀ (cows which went)

There are two differences between the two constructions. First, as can be seen in (14b) and (14d), voiceless stops become fricatives intervocalically in simple sentences but not in relative clauses.[5] Second, the tone pattern is different in (14c) and (14d), where the noun is low tone. The tone pattern in the simple sentences is what is expected, with oworo remaining entirely low tone. However, in the relative clauses, the middle o is suddenly high. The most obvious way to account for this is to postulate a high tone nonsegmental tone morpheme marking relative clauses which triggers TS. However, if this solution is accepted, once again TS "skips" an initial low tone vowel when it is followed by a low tone.

4. Tone copy revisited

In §3 it was shown that the phenomenon discussed in §2 where TS seemed to "skip" an initial low vowel when it was followed by a low is not an isolated case in that this "skipping" is generally the case when the high tone meeting the structural description of TS is a nonsegmental tone morpheme. If this is indeed the case, it suggests that TC does not simply change a high tone into a low tone as MSO suggest, but rather that it moves the high tone onto a nonsegmental matrix, leaving the original vowel with a low tone. In addition, the other tone rules will have to be formulated in such a way as to insure that a nonsegmental high tone will not affect the first vowel in a word like opɑt. One way this could be done would be by permuting the nonsegmental high tone and the initial low tone before applying TS, thus bleeding TS. Given this analysis, we would obtain the following derivation for rɪ̀ŋɔ̀pɑ̂t.

(15)

	/rìŋɔ́ ɔ̀pât/
TC (revised)	rìŋɔ̀ ˊ ɔ̀pât
Metathesis	rìŋɔ̀ ɔ́ˊpât
TS	---
Fall Creation[6]	rìŋɔ̀ ɔ́ˊpât
VC	rìŋɔ̀ ˊpât
	[rìŋɔ̀pât]

5. Possible further applications of nonsegmental tone

If the analysis presented here is correct, nonsegmental tones not only occur as underlying morphemes, but also can be created by phonological rules. In addition, some rules make reference to nonsegmental tones to the exclusion of segmental tones. In this last section, I would like to suggest two other areas in which a further extension of nonsegmental tones might be useful.

First, as has been shown by Peters (1973), the analysis of downstep and downdrift presented by Fromkin (1972) fails because it cannot assign the correct pitch value to a low tone following a downdrifted high tone. Peters points out that the analysis could be saved if a low tone which was later deleted were postulated before each lexically downstepped high tone, but like Fromkin, rejects this analysis on the basis that it would violate Kiparsky's constraint against "absolute neutralization". However, if instead of low tones which were later deleted, nonsegmental low tones were used, the constraint against absolute neutralization would have the same force it has in the case of boundaries--apparently none. That is, no one has used the constraint against absolute neutralization as an argument against the use of boundaries to trigger phonological rules, apparently because there is no need to have a rule deleting boundaries--it is merely part of the definition of [-segment] (a feature shared by boundaries and nonsegmental tones) that they have no direct surface manifestation. Thus, the use of nonsegmental low tones would make this objection to Fromkin's analysis void.

Second, it has been proposed by Koutsoudas, Sanders, and Noll (henceforth KSN) (1974) that rules apply whenever their structural descriptions are met unless such application is precluded by some universal principle. There is an apparent counterexample to this hypothesis in Lango which can be accounted for within the KSN framework if we claim that rules which delete vowels leave behind the tone on a non-segmental matrix. This apparent counterexample involves the apparent counterfeeding order between Fall Creation (FC) and Fall Simplification (FS). For example, the derivation of cál kónɔ̀ (example (3b) above) would proceed as follows:

(16)

	/cál kɔ̀nɔ̀/
TS	cál kônɔ̀
FS	cál kónɔ̀
	[cál kónɔ̀]

However, at this point, FC should be able to apply, yielding *cál kónô. It appears as though FC must be extrinsically ordered before FS so as to counterfeed it. However, if FS were to simply change the low part of the fall into a nonsegmental matrix, the low tone would intrinsically order the rules since it would prevent FC from affecting the final o of kono.

In conclusion, I have attempted to demonstrate that the phenomena of nonsegmental tone is more extensive than is generally recognized in that it can be created and referred to by phonological rules. In addition, I have presented two other areas where the concept of nonsegmental tones may be useful.

Footnotes

*I would like to thank Tim Shopen for getting me started in looking at most of the phenomena discussed in this paper, to Ashley Hastings for discussions over some of this paper, and especially to Jenny Okello, who, as an excellent informant and linguist really gave of her time to help with this paper. Needless to say, all errors are mine entirely.

[1]By nonsegmental tone, I mean a matrix marked [-segment, ±high]. I am using this term as a synonym for the perhaps more common "floating" tone as the term "nonsegmental" seems to more adequately capture the formal characteristics of such matrices. It is important that this use of nonsegmental tone is not confused with that of Fromkin (1972). In Fromkin's use, it is used for contour tones and thus has a surface representation. It seems to me to be better to save the feature [-segment] to refer to matrices with no direct physical manifestations (like boundaries) and handle contour tones as they are handled by Maddieson (1970), that is, as [-syllabic] segments following a [+syllabic] segment.

[2]I believe this rule to be incorrect for the following reason. MSO have to postulate in addition to this rule a rule which causes a low tone to become a fall when it is preceded in the same word by a high tone. Thus, two separate rules, Fall Creation and TS, create falls. This duplicity could be eliminated if there was one rule which caused a low to become a fall if it followed a high either in the same word or across a word boundary. In addition to this generalized Fall Creation rule, we would need a rule which made a low tone initial vowel into a high tone vowel if preceded by a high tone. This rule would then feed Fall Creation. However, as the analysis presented in this paper would not change given this formulation of the rules, I will accept for purposes of argumentation the formulation of the rules presented by MSO.

[3]The feature [±Raised] is proposed by Maddieson (1970) in place of the more common [±High].

[4]That this unexpected patterning is only found in constructions denoting inalienable possession is shown by the following examples:

(i) a. tyɛ̀n gɔ́ɔ́r (legs for the squirrels)
b. yíb gɔ́ɔ́r (tails for the squirrels)
(ii) a. tyɛ̀n dɔ̀k (legs for the cows)
b. yíb dɔ̂k (tails for the cows)

[5]The forms for "bees" and "cows" appear with the voiceless stop in isolation and before a consonant in addition to in the relative clauses.

[6]This rule of Fall Creation is independently needed and motivated by MSO and is discussed in footnote 1 above.

References

Fromkin, V. A. 1972. Tone features and tone rules. *Studies in African Linguistics* 3:47-76.

Kiparsky, Paul. 1968. How abstract is phonology. Unpublished paper.

Koutsoudas, A., G. Sanders, and C. Noll. 1974. On the application of phonological rules. *Language* 50:1-28.

Maddieson, I. 1970. *Tone in Generative Phonology (Research Notes* 3/2-3). Department of Linguistics and Nigerian Languages, University of Ibadan.

Maddieson, I., T. Shopen, and J. Okello. 1973. Lango tonology, suprasegmentality and paradigms. Paper presented at the Fourth African Linguistics Conference, Queens College, CUNY.

Peters, A. M. 1973. A new formalization of downdrift. *Studies in African Linguistics* 4:139-53.